Diabetes

Key Findings:
- Most people with diabetes get good quality care. Of people with known diabetes, 89% report getting their blood sugar checked, and 94% report getting their cholesterol levels checked.
- There has been progress in areas such as decreased hospital admission rates for uncontrolled diabetes. These rates were reduced by almost 30% between 1994 (40.7 per 100,000 population) and 2000 (28.5 per 100,000).
- Challenges remain in ensuring that people with diabetes get all recommended checkups (currently, 21% of people with diabetes are meeting this standard) and in reducing the rate of lower extremity amputations rates, which were unchanged from 1994 to 2000 (41.9 amputations per 100,000).

Background and Impact

Diabetes prevalence has risen in recent years, and this rise is projected to continue. Increases in the number of people with diabetes indicate that health status in America is changing, and the current health care system must respond in order to prevent and manage a disease that is manageable and preventable in some people. National statistics on diabetes highlight the challenge facing the United States:

- Over 17 million people—6.2% of the population—have diabetes. Of these, it is estimated that approximately 5.9 million people do not know that they have the disease. Moreover, the prevalence of diabetes is projected to increase 44% in the general population by 2020.[1]

- Diabetes was the sixth leading cause of death listed on U.S. death certificates in 1999.[2]

- Diabetes is the most frequent cause of blindness among working-age adults; the leading cause of nontraumatic lower extremity amputation and end-stage renal disease; and a principal cause of congenital malformations, perinatal mortality, premature mortality, and disability.[3]

- Diabetes has been linked to a range of other illnesses, in particular cardiovascular disease. People with diabetes are at increased risk for stroke, ischemic heart disease, peripheral vascular disease, and neuropathy.[4]

- The total cost of diabetes in America is estimated at $132 billion for 2002, of which nearly $91.8 billion is in direct medical costs, and nearly $40 billion is in indirect costs related to disability, work loss, and premature mortality.[5]

- Type 2 diabetes, which affects 90-95% of people with diabetes, has been linked to the national increase in obesity. Type 2 diabetes increased 33% from 1990 to 1998.[6]

Diabetes and its complications often can be effectively managed with appropriate health care and patient self-management.[7,8] Because of the chronic nature of the disease, preventing complications associated with diabetes can have far-reaching effects. Moreover, because of its prevalence and the link between care and outcomes (including quality of life and work productivity), improving diabetes quality of care can have a marked effect on the health of the U.S. population.[9] High quality care for diabetes involves all the aspects of good health care: proper prevention, integration of different clinical specialties, effective provider-patient communication, and patients' self-management of their illness.

How the NHQR Measures Diabetes Quality

The NHQR tracks a set of measures on the management of diabetes based on national consensus and standards and on evidence-based research (see Figure 6). These measures assess national performance in:

- Percentage of patients with diabetes who receive recommended tests and immunizations to help prevent complications associated with diabetes.

- Percentage of patients whose diabetes is effectively managed as indicated by the results of a variety of clinical tests.

- Rate of hospital admissions for uncontrolled diabetes and its complications. These measures help assess the adequacy of primary care that has been shown to reduce the need for hospitalization, but they may also be influenced by many other factors, including cultural and geographic factors and patient preferences.

The report includes measures that track how well we are doing nationally to ensure optimal care, i.e., the number of people with diabetes whose hemoglobin A1c levels are at an "optimal" level as defined by national guidelines. This approach was arrived at after considerable consultation with diabetes experts and review of reference documents on measures from leading Federal and private organizations in the field of diabetes quality of care measurement. These organizations include:

- National Institutes of Health, specifically the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and the National Heart, Lung and Blood Institute (NHLBI)

- National Diabetes Quality Improvement Alliance

- American Medical Association

- National Quality Forum

- Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS) and National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP),

- Centers for Medicare & Medicaid Services (CMS)

A list of the measures included is presented as an addendum to this chapter.

Figure 6. Process measures of quality care for diabetes in adults age 18 and older, 2000
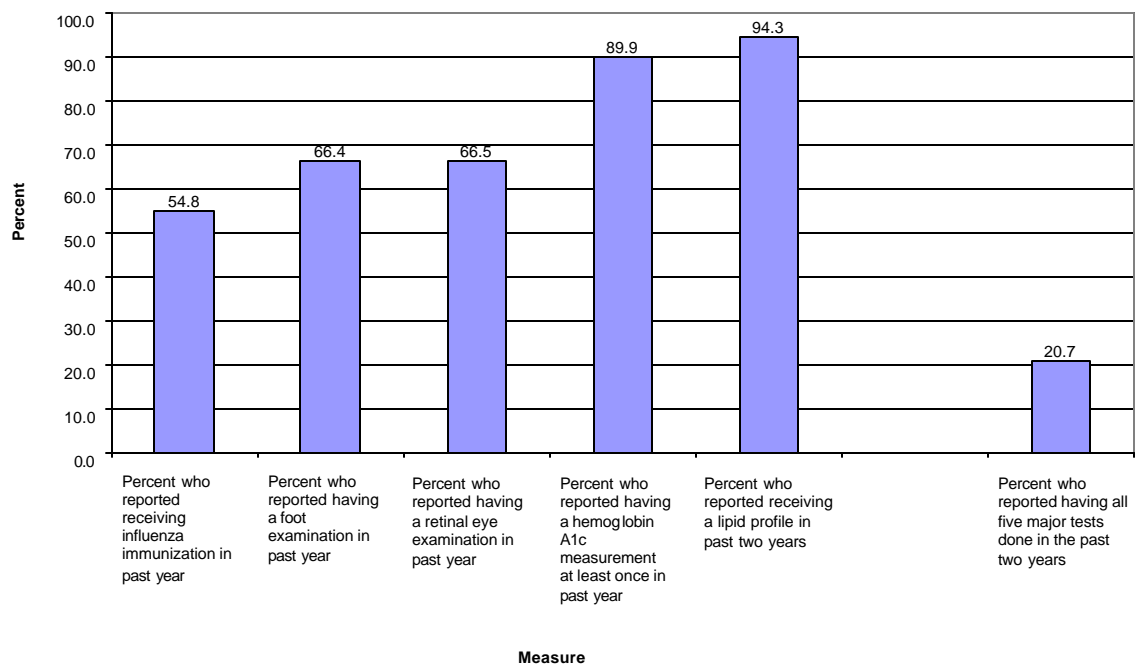
Source: Medical Expenditure Panel Survey (MEPS), 2000.

How the Nation Is Doing[i]

Receipt of Key Examinations and Immunizations

High quality of care for diabetes is based on ensuring that people with diabetes have needed tests that can help them and their providers manage their condition. All people with diabetes should obtain these services, which are relatively inexpensive to provide. The data presented below show that there is variability in the use of these services.

- Across the five "process" measures of care (annual retinal eye exams, annual influenza vaccinations, annual HbA1c checks, annual foot exams, and biannual lipid profiles), there is considerable variability in the delivery of services. Nearly half of all patients with diabetes do not receive a vaccination for influenza annually, and nearly one-third of diabetes patients did not have an eye or foot exam in the past year. At the same time, the vast majority of patients with diabetes receive important checks on their HbA1c levels and lipid profiles annually (89% and 94%, respectively, for the two measures). (MEPS, 2000)[ii]

- In 2000, 20.7 % of patients reported having received all five major tests in the past 1 to 2 years (depending on the standard for the test) (MEPS, 2000).

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[i] Adjusting for known contributing factors, such as gender, age, and insurance status (multivariate analysis), would allow for more detailed exploration of the data, but this generally was not feasible for this report. Any adjustments that were done are noted in the detailed tables. The data presented in this report do not imply causation.

[ii] For the HbA1c Medical Expenditure Panel Survey (MEPS) measure, a large group of interviewees stated that they did not know whether they had received an HbA1c test in the past year. Additional information on this non-response is presented in the NHQR Tables Appendix.

Cutpoints for HbA1C Control

Decisions on whether to track minimally acceptable quality or optimal levels of quality of care must be based on the goal of the quality assessment effort.[10, 11] In many areas of measurement within the report framework, there has been considerable development of two types of measurement standards: (a) "evidence-based practice guidelines" based on research findings, and (b) "performance measures" usually based on efforts to ensure health care provider accountability.[12] The use of different cutpoints in, for example, measuring HbA1c levels, highlights how national performance can be seen as very uneven. Figure 7 illustrates this using national data from the National Health and Nutrition Examination Survey (NHANES).

For diabetes measurement in the first NHQR, an HbA1c level over 9.5% is considered poor control, under 9.0% is considered minimal control, and under 7.0% is considered optimal control.[13, 14] While three-quarters of diabetes patients in America are receiving care that is helping them keep their HbA1c levels under minimally acceptable control, nearly two-thirds of diabetes patients do not meet optimal HbA1c levels.

Figure 7. Percent of diabetes patients who have HbA1c under control, 1999-2000
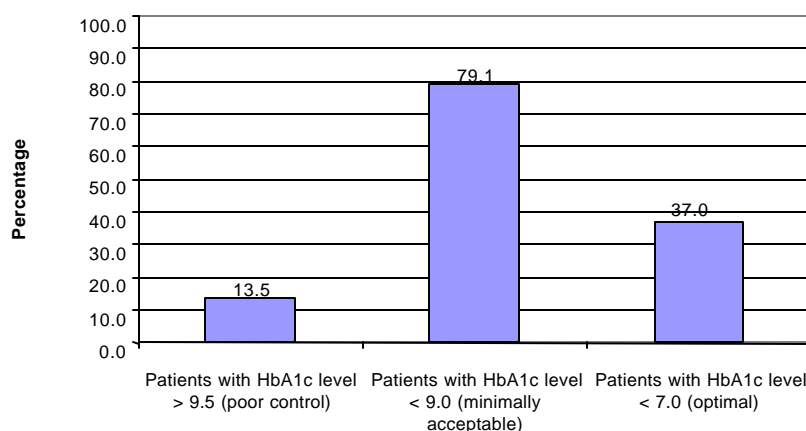
Note: In the National Quality Forum consensus measure set on diabetes quality and in documentation from the National Diabetes Quality Improvement Alliance, the 7.0 clinical cutpoint is intended for management of an individual patient, while the 9.5 value is intended for looking at population data. New guidelines on control of HbA1c were under development during the development of the NHQR and will be reflected in future reports.

Hospital Admissions for Complications Associated with Diabetes

Opportunities for improvement are apparent when examining outcome measures such as hospital admissions for complications associated with diabetes. Although some admissions for diseases like diabetes are unavoidable for a variety of factors, in general, these admissions may reflect inadequate primary care and patient self-management. The analysis shows that, as a Nation, we are improving in the rate of hospital admissions for uncontrolled diabetes. Rates of such admissions were reduced by nearly 30% between 1994 (40.7 per 100,000 population) and 2000 (28.5 per 100,000) (HCUP, 2000).

However, the rate of admissions for lower-extremity amputations has not changed between 1994 and 2000 (41.9 amputations per 100,000). This measure may reflect poor long-term management of diabetes (HCUP, 2000).

What We Don't Know

The management of comorbid conditions that develop with diabetes is a key area of concern for health care professionals and their patients. By tracking eye and foot screening as well as amputation rates, we have some measurement of how well the health system is doing in delivering care for the consequences of diabetes. We need to know more, however, about how well care is being delivered for other common conditions associated with diabetes.

Innovative approaches to the practices and integration of care for people with diabetes have been shown to improve their health in selected instances.[15, 16, 17, 18] More information about how these practices can be implemented on a wider scale is needed.

Diabetes care is tracked by several national surveys, including among others the National Health Interview Survey, MEPS, the Behavioral Risk Factor Surveillance System, and NHANES, where both patient reported information and physiological data from examinations are available. Estimates of the same measure can be different in these different surveys. Further examination of how results differ across the surveys and issues of validity and reliability of these different surveys in assessing diabetes care would offer clarity for researchers and policymakers tracking diabetes quality of care.

What Can Be Done

There is significant activity in the area of diabetes quality measurement at the national level in the United States. What is not entirely clear is how to translate this ever broadening consensus building on what is important to measure for diabetes quality into actual improvements in practice.

State Variation in Admissions for Uncontrolled Diabetes Without Complications[iii]

Adult admissions for uncontrolled diabetes without acute or long-term complications vary across the Nation.   In preparing for the next national report, several States shared, in advance, their rates of admission for uncontrolled, uncomplicated diabetes , which represent potentially preventable hospitalizations. While this is not a complete or random sample of States, the admission rates (see Figure 8) differ by almost five times from the lowest to the highest among these States. The States shown are part of AHRQ's Federal-State-Industry partnership, known as the Healthcare Cost and Utilization Project (HCUP), which combines States' hospital discharge records into a uniform database to make such insights possible. The U.S. rate is based on the Nationwide Inpatient Sample, a sample of hospitals from 28 HCUP States weighted to a national estimate.

What causes differences among the States in these potentially preventable hospitalizations? Some patterns can be seen between uncontrolled diabetes admissions and selected environmental and behavioral risk factors as shown in aggregate State-level statistics in the chart below. For example, States with higher admission rates for uncontrolled, uncomplicated diabetes also have higher rates of obesity and poverty. These States also have higher diabetes prevalence, meaning more State residents with known diabetes .

However, given the wider variation in hospital admissions, other factors may contribute. These may include levels of access to health care professionals, emergency rooms, and hospital beds; availability of health insurance coverage; differences in diabetes management within ambulatory care settings, such as success in monitoring glycemic control, and adjustm ents about when to hospitalize; readmissions due to no or ineffective patient education programs; patient compliance with treatment regimens and patient knowledge about the warning signs of the disease, importance of diet and exercise, potential complications, and when to consult a doctor. Also, HCUP relies on State-specific data collection methods, which may contribute to the differences.

Figure 8. Uncomplicated, uncontrolled diabetes admission rates and related factors by State, 2000

Horizontal lines represent the U.S. admission rate and its confidence interval.
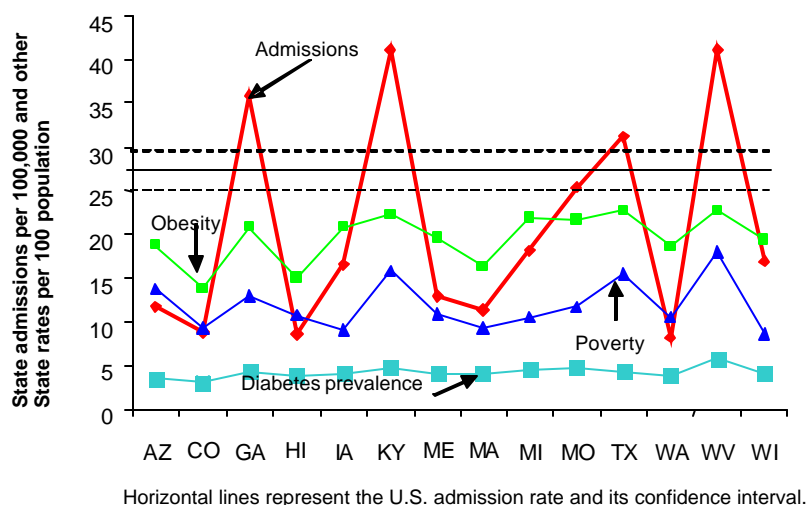
Sources: Selected HCUP Partner States, BRFSS, and U.S. Census.

[iii] HCUP Partners providing their data for this example are: Arizona Department of Health Services, Colorado Health & Hospital Association, Georgia Hospital Association, Hawaii Health Information Corporation, Iowa Hospital Association, Kentucky Department for Public Health, Maine Health Data Organization, Massachusetts Division of Health Care Finance and Policy, Michigan Health and Hospital Association, Missouri Hospital Association, Texas Health Care Information Council, Wisconsin Department of Health and Family Services, Washington State Department of Health, West Virginia Health Care Authority.

One area of activity is the effort to "drill down" into existing data to better understand why some areas of the country do better than others at delivering diabetes care. Future efforts should involve expanded examination of State and regional data. One such source is the Healthcare Cost and Utilization Project (HCUP), which builds a set of State and national databases that can be used to track a variety of quality measures. A first look at some State analysis for diabetes quality of care follows.

A second area where work is being done to move from data to action in diabetes quality of care is the Translating Research Into Action for Diabetes (TRIAD) study. The TRIAD study is a multicenter prospective study that seeks to identify modifiable barriers to optimal diabetes care across diverse managed care settings. This multicenter observational study in 2000-2001 was run as a partnership between Federal and private sector partners that attempted to examine the structural and organizational characteristics of health systems and healthcare provider groups that affect quality of diabetes care.[19] Data and findings from the study are now being published.[20]

A third area where progress can be made is in comprehensive diabetes programs based on patient education. The National Diabetes Education Program (NDEP) is a federally sponsored initiative that involves public and private partners to improve treatment and outcomes for people with diabetes, promote early diagnosis, and prevent the onset of diabetes. NIDDK (a component of HHS's National Institutes of Health) and CDC's Division of Diabetes Translation jointly sponsor the program with the participation of over 200 partner organizations. NDEP strategies include creating partnerships with organizations concerned about diabetes and the health status of their constituents and developing and implementing ongoing diabetes awareness and education activities and tools. One organization working with NDEP on improving diabetes care in the community is the Comprehensive Diabetes Control Program run by the Michigan Department of Community Health (see Figure 9). This "best practice" in diabetes care is highlighted in the Assistant Secretary for Health's Best Practice Initiative. In addition, CMS selected improvement of diabetes care as a priority for its QIOs in each State starting in 1999.

Figure 9. Michigan Comprehensive Diabetes Control Program

In 1995, Michigan completed the establishment of a Statewide network of six regional Diabetes Outreach Networks (DON). The DON mission is to increase innovative partnerships to strengthen diabetes prevention, detection, and treatment throughout Michigan.

Results from the Michigan DON demonstrate that working with health care agencies and providers through a Statewide Diabetes Care Improvement Project can result in improved outcomes for people with diabetes. Trends in followup data from FY 1996 through FY 2001 for HbA1c measurement, foot exams, and microalbuminuria (all done at least once annually) show a significant improvement in the number of people with diabetes having these tests done (see Figure 10). Moreover, individualized data analysis from the regional DONs also shows a positive downward trend in the levels of glycosylated hemoglobin.
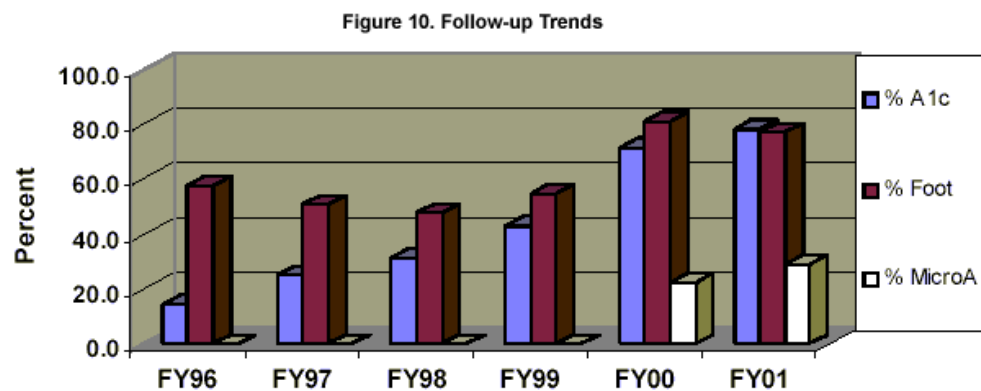

Figure 10. Follow-up Trends

Figure 10, above, is reproduced from the Best Practice Initiative web site
http://www.osophs.dhhs.gov/ophs/BestPractice/MI.htm (Accessed 5/12/03)

List of Measures

Diabetes

Measure Title	National	State
Management of diabetes:		
Process: % of adults with diabetes who had a hemoglobin A1c measurement at least once in past year	Table 1.20a (00) Table 1.20b	Table 1.20c (01)
Process: % of patients with diabetes who had a lipid profile in past two years	Table 1.21(00)	XXX
Process: % of adults with diabetes who had a retinal eye examination in past year	Table 1.22a (00)	Table 1.22b (01)
Process: % of adults with diabetes who had a foot examination in past year	Table 1.23a (00)	Table 1.23b (01)
Process: % of adults with diabetes who had an influenza immunization in past year	Table 1.24a (00)	Table 1.24b (01)
Outcome: % of adults with diagnosed diabetes with HbA1c level >9.5% (poor control); < 7.0 (optimal);<9.0 (minimally acceptable)	Table 1.25	XXX
Outcome: % of adults with diagnosed diabetes with most recent LDL-C level < 130 mg/dL (minimally acceptable); <100 (optimal)	XXX	XXX
Outcome: % of adults with diagnosed diabetes with most recent blood pressure <140/90 mm/Hg	Table 1.26	XXX
Outcome: Hospital admissions for uncontrolled diabetes per 100,000 population	Table 1.27 (00)	XXX
Outcome: Hospital admissions for short-term complications of diabetes per 100,000 population	Table 1.28 (00)	XXX
Outcome: Hospital admissions for long-term complications of diabetes per 100,000 population	Table 1.29 (00)	XXX
Outcome: Hospital admissions for lower extremity amputations in patients with diabetes per 1,000 population[iv]	Table 1.30 (00)	XXX

[iv] This measure is one where two comparable national data sources exist, the National Hospital Discharge Survey and the Healthcare Cost and Utilization Project. Both data sources present information on potentially preventable hospital admissions with some slight variation in the measure specifications for individual measures. This report relied on Healthy People 2010 measure specifications to determine which data source should be used in the report for individual measures. More information is available in the Measures Specifications Appendix. More information on the NHDS is available at http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm. More information on HCUP and the AHRQ Quality Indicators is available at www.ahrq.gov/data/hcup.

References

[1] American Diabetes Association. Economic Costs of Diabetes in the US in 2002. *Diabetes Care* 26:917-932, 2003.

[2] Arias and Smith. Deaths:preliminary data for 2001. National Vital Statistics Report Vol 51 No. 5. NCHS. 2003.

[3] Institute for Healthcare Improvement and the Health Services Resources Bureau. *Health Disparities Collaboratives: Diabetes Training Manual*. (Boston: IHI). 2002.

[4] American Diabetes Association. Diabetes Fact Sheet (from ADA web site). http://www.diabetes.org/main/info/facts/facts_natl.jsp. (Accessed 3/22/03

[5] American Diabetes Association. Standards of Medical care for patients with diabetes mellitus. Diabetes Care 2003;26(Suppl 1): 533-50.

[6] Mokdad AH, Ford ES, Bowman BA, Nelson DE, Engelgau MM, Vinicor F, et al. Diabetes trends in the U.S.: 1990-1998. Diabetes Care 2000;23(9):1278-83.

[7] Department of Health and Human Services Centers for Disease Control and Prevention. Diabetes at a Glance. *Diabetes: Disabling, deadly, and on the rise*. 2002.

[8] American Diabetes Association. Standards of Medical care for patients with diabetes mellitus. *Diabetes Care* 2003; 26(Suppl 1): 533-50.

[9] Testa MA, Simonson DC. Health economic benefits and quality of life during improved glycemic control in patients with type 2 diabetes mellitus: a randomized, controlled, double-blind trial. JAMA 1998;280(17):1490-6.

[10] Rooney AL, van Ostenberg P. *Licensure, Accreditation and Certification: Approaches to Health Services Quality*. April 1999. Bethesda, MD: Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project.

[11] Epstein A. Rolling down the runway: The challenges ahead for quality report cards. *JAMA*. 1998; 279; 1691-6.

[12] Malley AS, Clancy C, Thompson J, Korabathina R, Meyer G. Clinical practice guidelines vs. performance indicators: Where do they differ and does it matter? Submitted for publication in the *Joint Commission Journal on Quality and Safety*. 2003.

[13] American Diabetes Association. Tests of Glycemia in Diabetes. *Diabetes Care* 26:S106-S108, 2003 (For additional clarification on optimal cutpoints in HbA1c measurement, please see: National Institutes of Health/National Institute of Diabetes and Digestive and Kidney Diseases. Member comments provided to the National Forum for Health Care Quality Measurement and Reporting during review of National Consensus Standards for Adult Diabetes Care (as referenced in *Core Performance Measures for Adult Diabetes Care* Member Comments document) and Comments letter provided to National Healthcare Quality Report Federal Interagency Workgroup, Meeting to Review NHQR Proposed Final Measure Set, January 10, 2003.)

[14] National Forum for Health Care Quality Measurement and Reporting. *National Voluntary Consensus Standards for Adult Diabetes Care*. (Washington, DC: National Quality Forum). 2002.

[15] Texas Medical Foundation. *Compendium of Diabetes Best Practices*. (Austin, TX: Texas Medical Foundation). 2001. Published with support from the Centers for Medicare & Medicaid Services.

[16] Gohdes D, Rith-Najarian S, Acot K, Shields R. Improving diabetes care in the primary health setting: The Indian Health Service experience. *Ann Intern Med*. 1996 Jan 1;124(1 Pt 2):149-52.

[17] Wasson J, Gaudette C, Whaley F, Sauvigne A, Baribeau P, Welch HG. Telephone care as a substitute for routine clinic follow-up. *JAMA*. 1992;267:1788-93.

[18] Friedman NM, Gleeson JM, Kent MJ, Foris MF, Rodriguez DJ. Management of diabetes mellitus in the Lovelace Health Systems; EPISODES OF CARE program. *Effective Clinical Practice*. 1998;1:5-11

[19] The TRIAD Study Group. The Translating Research Into Action for Diabetes (TRIAD) study: a multicenter study of diabetes in managed care. Diabetes Care. 2002 Feb;25(2):386-9.

[20] Karter AJ, Stevens MR, Herman WH, Ettner S, Marrero DG, Safford MM, Engelgau MM, Curb JD, Brown AF. Out-of-pocket costs and diabetes preventive services: the Translating Research Into Action for Diabetes (TRIAD) study. Diabetes Care. 2003 Aug;26(8):2294-9.